



A BASIC APPROACH TO THE EXAMINATION AND ASSESSMENT OF SICK CHILDREN FOR EXAMINATION PURPOSES

The following suggestions are made to help you prepare for post graduate clinical examinations, but most of the techniques and principles apply you to your day-to-day conduct of clinical paediatrics

Step 1: Introductions

- Greet the mother, child and your examiners cheerfully and introduce yourself

Step 2: The “crime scene”

- Briefly describe the child in the environment (“the crime scene”). For example “the child is sitting comfortably on her mother’s lap” or “the child is desperately ill in headbox oxygen connected to a sats monitor”.
- State the obvious if abnormalities are obvious, for example “the child has a very big head”.
- Look out for clues around the bedside like a container containing dark urine (APSGN) or pale stool (cholestatic jaundice) etc.

Step 3: Undress the child

- Undress the child completely after asking permission from the mother and/or the examiners. Do up the nappy once you have checked the perineum. In older children be careful not to embarrass them. Try not to let the child get cold.

Step 4: Nutritional Assessment

Macronutrients

- Mention obvious clinical features if present, for example “this child has visible severe wasting” or “this child has features of kwashiorkor” or “this is a chubby child”. While looking for obvious features check for oedema.
- Ask to look at the Road to Health Card to look at the trend.
- **Plot the child’s weight on the growth charts provided. Before plotting make sure you have the correct growth charts (there are lots of different charts so look at the axis carefully and get familiar with as many growth charts as possible). Plot wt for age, ht for age and head circumference. You may need a tape measure to measure the head circumference but weight and height are usually provided.**
- State your nutritional assessment according to the Welcome Classification. Not all growth charts have the 60% of EW line on them so you will need a calculator to make this assessment.
- Be familiar with the Waterlow Classification and be confident in working it out. There is no time for hesitation so work out the Waterlow Classification with every child you see so that you are not stressed by it.

Miconutrients

- It is easy to get lost and waste time with this examination so develop a slick system and only look for important micronutrient deficiencies
- Iron: pallor (folate and B12 deficiency also cause pallor but less common)
- Fat soluble vitamins:
 - A - Look for xerophthalmia, Bitot’s spots and keratomalacia
 - D - Look for signs of rickets
 - E - Not useful. Deficiency causes a haemolytic anaemia and neuropathy
 - K - Look for evidence of easy bleeding/ bruising like petechiae and bruises
- Water soluble vitamins:
 - C - Scurvy (Perifollicular haemorrhages, petechiae and gums may bleed)
 - Nicotinic acid - Pellagra (hyperpigmented rash in sun exposed areas)
 - The other water soluble vitamin deficiencies are rare
- Trace elements
 - Zinc deficiency is particularly associated with a rash but overt deficiencies rare

Common exam cases include:

- Marasmus
- Kwashiorkor
- Rickets
- UWFA
- Anaemia

Step 5: Dysmorphology

- Look for dysmorphic features.
- If a syndrome that you recognize is very obviously present you can say that the child has the syndrome and then go on to describe the features. This can be dangerous when you confidently say a normal child has Trisomy 21.
- It may be safer to say that the child has the following dysmorphic features (then describe them) and say that this is in keeping with a particular syndrome (if you recognize it) or that you do not recognize a particular syndrome and would either refer or try to look it up.

Step 6: General Examination

- If you forgot to plot the weight and height, do it here.
- JACCOL must be done quickly and confidently. If you are very sure of yourself you can mention only the positive findings and relevant negative findings but it is easy then to leave important things out.
- TB: Comment on the presence or absence of the BCG scar and look for evidence of a recent tuberculin test.
- Hydration if relevant.

Including vital signs here can be distracting. They are best covered in the relevant system.

Step 7: Systems Review

- Start with the system that your history and examination so far suggest is affected.
- Do not say "on inspection" etc but describe in a systematic way while giving a running commentary.

The Cardiovascular System

Extra General features include:

- Signs of Infective Endocarditis (clubbing, splinter hx, Osler's nodes, Janeway's lesions, fever, splenomegaly, haematuria)
- Signs of Acute Rheumatic Fever (arthritis, rash, nodules, chorea, fever)
- Plethora in CCHD

1) Pulses

- Rate, rhythm, volume, are all pulses present?
- Radio-femoral delay only relevant in the older child once collaterals have had time to develop (older than about 6 years)

2) Blood Pressure

- Check BP and four limb BP if the child has primarily a CVS problem. (Very often a baumanometer is not available but you must ask)

3) JVP

- This is unhelpful in the infant and small child because of their short necks.
- Use correct technique (cushions to 45 degrees) in the older child.

4) Praecordium

- Comment on the shape and any asymmetry. Look for a prominent left chest which suggests longstanding cardiomegaly. Often best to look from the end of the bed.
- RVH – feel for an epigastric pulsation and a left parasternal lift indicative of RVH.
- Look for and palpate the apex beat. Is it diffuse suggesting a volume overloaded left ventricular or well localized suggesting a pressure overloaded LV? If the apex is displaced then check the position of the trachea (to make sure that the heart is big and the displaced apex is not due to a shifted mediastinum).
- Can you feel any thrills?
- Percussion is really only used if a large pericardial effusion is suspected and then the dullness will extend beyond the apex beat.
- Auscultate in all four areas and comment on:
 1. Heart Sounds – decide if normal S1 and S2. Listen for a loud S2 (P2) suggesting pulmonary hypertension. Listen for a S3. Childrens' hearts go faster than adults so do not try to be too clever.
 2. Additional sounds like a pericardial friction rub or an opening snap in MS (rare in children)
 3. Murmurs – decide if they are systolic or diastolic or both. What sort of murmur (esm/mdm/psm). It is usually better to describe systolic murmurs as long or short as this enables you to have a wider differential diagnosis. Grade them. Where are they maximal and where do they radiate to?
 4. Then feel for a big liver (CCF) and spleen (IE)

By the end of the CVS exam you should be able to make a reasonable assessment:

1. **What is the lesion?** It is not always necessary or possible to make the correct diagnosis clinically. Decide if congenital (usually a young child) or acquired (usually an older child). If congenital, decide if ACHD or CCHD and offer the most likely lesion with a sensible differential diagnosis.
2. **Is there CCF?** (big heart/big liver/fast heart/fast breathing)
3. **Is there PHT?** (loud P2 and evidence of RVH)
4. **Is there IE?**
5. If Congenital HD, is there a **Sx associated?** If Acquired HD (usually RHD, sometimes CMO) is there **Acute Rheumatic Fever** at present?
6. Is there growth/development failure?

Common CVS cases

- Acyanotic Congenital Heart Disease
 - VSD
 - PDA
 - ASD
- Cyanotic CHD
 - AVSD
 - TOF
 - Post operative (Do not panic!)
- Acquired Heart Disease
 - CMO
 - RHD

The Respiratory System

Extra General features include:

- Signs of Chronic Suppurative Lung Disease – hallitosis and a productive cough
- Parotid enlargement in LIP
- Plethora

1) Comment on

- Respiratory rate
- Alar flare
- Recession
- Shape of the chest (abnormally shaped chest suggests a chronic problem), e.g.
 1. Assymetry
 2. Enlarged AP diameter
 3. Harrison's sulcus
 4. Pectus carinatum/excavatum etc.
 5. Scars of previous surgery or chest drain sites
- Audible sounds like stridor/stertor/snoring and wheeze

2) Feel for

- Chest wall excursion
- Trachea
- (Vocal fremitus)

3) Percuss

- Do not percuss ad infinitum – be confident and have a system
- Look for obvious differences between the left and right chest
- Look for signs of hyperinflation – loss of cardiac dullness and upper border of liver pushed down (usually in 4th to 5th intercostal space)

4) Auscultate

- Again auscultate with confidence and do not spend forever listening
- Listen for decreased breath sounds – the abnormal side is usually the side with decreased breath sounds
- Be careful not to say the child has bronchial breathing if you are listening near the trachea
- (Vocal resonance)

Common Cases:

- Chronic Suppurative Lung Disease (LIP/Bronchiectasis/CF/Other)
- Always look for Cor Pulmonale in Chronic Lung Disease
- Pleural Effusion
- ARI with or without LAO

The Abdomen

Extra General features include:

Signs of Chronic Liver Disease / Failure:

- foetor, scratch marks from itching, palmar erythema
- rickets because of malabsorption of Vit D
- bleeding/bruising because of malabsorption of Vit K
- Vit A deficiency

1) Look for

- Abdominal distension
- Dilated superficial veins
- Scars of previous surgery or biopsies
- Herniae

- Genitalia
- Anus

2) Palpate

- First gently for tenderness and any obvious masses
- Feel for hepar and describe: tender or not, size (cm below costal margin in the midclavicular line and also percuss the upper border – should be in 4th to 5th ICS), edge (sharp or rounded), texture (normal, firm or hard), surface etc
- Feel for spleen and describe: tender or not, size (longest measurement – spleens can enlarge in any direction – from the costal margin), notch, texture etc.
- Feel and describe any other masses, e.g. nodes, tumours
- Fluid thrill

3) Percuss

- For shifting dullness

4) Auscultation is usually not very helpful

- Listen for bruits over the liver, aorta and kidneys
- Abnormal or absent bowel sounds in obstruction

Common cases:

- Cholestatic Jaundice
- Chronic Liver Disease with Cirrhosis
- Portal Hypertension
- HSM due to RVD (and others)
- TB abdomen
- Tumours (Wilm's, Hepatoblastoma, Neuroblastoma) are rare as it is not fair to subject these children to the exam process

The Central Nervous System

- Extra General features include:
 - Neurocutaneous lesions – café au lait spots etc.
 - Look at the back for MMC, gibbus and kyphoscoliosis
 - Look at the head and abdomen for VP shunt scars
 - Dymorpholgy important
 - Look for hypertrophied calf muscles
- Here the process differs from the other systems:
- First just look at the child for abnormal posture and movements. Get the child to sit and walk, and get up from the floor if possible as this will give you important hints.

1) Start at the head

- Size of head – measure and plot on graph and say if normal, big or small for age
- Shape of head
- What is the level of consciousness
- Is there any meningism?

2) Cranial nerves – this is a functional assessment

- 1 (olfactory) - is boring and not usually tested in children
- 2 - best method of finding out if a child can see is to see if the child fixes and follows your smiling face. Also try to look at the fundi but leave till last so as not to upset the child
- 3, 4 and 6 - are important. Look for ptosis (3rd) and then see if the eyes move in all directions. If they do then these nerves are intact. A 6th means that the eye on the affected side cannot look laterally. Also check PEARL.
- 5 - we do not check corneal reflexes in the awake child as they are painful, but one can try checking sensation with soft touch on the face
- 7 - Is the face symmetrical when crying or smiling? Can the child wrinkle the forehead and close eyes tightly? A LMN lesion will affect both upper and lower halves of the face whereas an UMN lesion will affect only the lower half.
- 8 - Can the child hear? Ask mum or jangle keys outside of vision
- 9,10 and 12 - Can the child swallow? Is the child drooling?
- 11 - Shrug shoulders, if old enough

3) Long tracts

- Tone
 - Posture – hypotonic babies lie in froglike posture; hypertonic babies are often opisthotonic
 - Check truncal tone – pull to sit, ventral suspension and sitting
 - Check limb tone – different to adults
- Power
 - First look at spontaneous movement and for any asymmetry

- Then decide on /5 power for each limb
- Look for wasting
- Look for fasciculation (tongue and muscle)
- Reflexes
 - Same as in adults except be more gentle when checking for the plantar response. Don't forget clonus. Also a few extra reflexes in CP's – adductor reflex and spreading of the knee jerk
- Sensation
 - Do not hurt children with pins in an exam
 - Look for clues of decreased sensation like pressure sores

1) Cerebellar signs

- In young children look for ataxia when sitting and nystagmus
- In the older child one can test dysdiadochokinesis, the finger-nose test and the heel-knee test and also look for an intention tremor.

2) Developmental assessment - brief

- Motor (most important) – can the child sit (6/12) etc
- Fine motor – less easy to do in exam
- Personal / social
- Speech

At the end of the assessment you should be able to say:

- What is the dysfunction ? e.g. spastic quadriplegia with profound developmental delay
- Where is the lesion? e.g. cerebral cortex
- What is the aetiology? e.g. infarct due to HIE

Common CNS cases include:

1. Cerebral palsy
2. Spastic Quadriplegia
3. Spastic Diplegia
4. Paraplegia following a cord lesion – TB spine or MMC
5. Hydrocephalus
6. Hemiplegia
7. Duchenne's Muscular Dystrophy
8. SMA

Muscular Skeletal System

Extra General features include:

- Malar rash of SLE
- Supraorbital rash of dermatomyositis
- Signs of ARF
- Then examine each joint looking for:
 - Tenderness
 - Warmth
 - Swelling
 - Synovial thickening
 - ROM (always get child to move it first – be careful, do not hurt child)
 - Deformities

Describe each and every affected joint briefly.

Work out your differential diagnosis for mono and polyarthritis in children.

Common Cases:

- Rickets
- JRA with or without HIV
- SLE
- Haemophilia
- TB spine/arthritis
- Leukaemia can present with painful joints as can ARF

The Assessment

This is vital and often poorly made. It is easier than you think!

Include all **problems** that you have identified. Do not simply list all positive findings as that is boring. Assess the child – do not summarize as you are a post graduate now. Start with safe ground for example:

“My assessment of Andile is that he is a 3 year old little boy who is underweight for age.”

(The name and age of the child are not controversial and the nutrition is vital)

“He has chronic suppurative lung disease” (if they ask why you make that assessment you will simply say that his abnormally shaped chest, clubbing and cough productive of purulent sputum are evidence of CLD). “He also has evidence of Cor Pulmonale” (you found epigastric pulsation, a LPSH and a loud P2).

“He also has generalized lymphadenopathy.”

“From my experience the causes of these problems in children are most likely due to HIV infection with CLD following recurrent or severe infections. He does not have parotid enlargement but I think it is still important to consider LIP. Other important considerations would include TB as it is important to remember that not everything is due to HIV and to consider other causes like cystic fibrosis, which although uncommon, do occur in black children.” (You have just given a sensible differential diagnosis. If the examiners want more they will ask.)

“My approach to managing this child would be”:

First, relevant history including the HIV status, TB contacts, any severe/recurrent ARI's and previous pulmonary TB.

The relevant investigations would include:

1. HIV status
2. CXR – “I would look for changes suggestive of TB or LIP and most importantly it would be useful to review old CXR's”
3. Mantoux and AFB's
4. CD4% if HIV infected and a review of social circumstances to determine eligibility for ARV's
5. FBC looking for evidence of acute infection (WCC) and the Hb to determine if plethoric from long term hypoxia or anaemia
6. ESR non specific
7. TP and alb will give one an idea of the inflammation

Management depends on the cause etc.

The longer you talk sensibly, the better you will do. To do well, you need to efficiently examine the child so that there is time for your assessment and discussion! Time is of essence.

Disclaimer: Develop a systematic approach that suits you. This is a generic guide.